

CLAIMS

1. A digital TV receiver comprising:

An automatic gain controller (AGC) for processing a feedback signal for outputting
5 control signals for independent gain control of an RF amplifier and an IF amplifier;

An analog to digital converter (ADC) for converting analog signal output from the
IF amplifier; and

A demodulator for demodulating the signal output from the ADC and outputting a
demodulated signal to a signal processor, wherein the demodulated signal and the
10 signal output from the ADC are selectively used as the feedback signal in the AGC.

2. The digital TV receiver according to claim 1, wherein a coefficient update signal is
output by a coefficient updator for adaptively adjusting the coefficient update signal
based on saturation characteristics of the demodulated signal.

3. The digital TV receiver according to claim 2, wherein the AGC includes an IF
gain controller for obtaining an error signal based on the difference between the
coefficient update signal and one of the demodulated signal and the signal output

from the ADC, and the IF gain controller has piece-wise linearization stages for processing the error signal to control the IF gain.

4. The digital TV receiver according to claim 2, wherein the AGC includes an RF gain controller for obtaining an error signal based on the difference between the coefficient update signal and one of the demodulated signal and the signal output from the ADC, and the RF gain controller has piece-wise linearization stages for processing the error signal to control the RF gain.

5. The digital TV receiver according to claims 3 or 4, wherein the piece-wise linearization stages include: first stage for resetting the error signal to a predefined constant if a power of the feedback signal is within a high one of a high, middle and reference power level regions, and for passing-through the error signal if the power of the feedback signal is within one of the middle and reference power level regions; and a second stage for disproportionally scaling the output of the first stage based on the power level region.

6. The digital TV receiver according to claim 5, wherein the piece-wise linearization stages further include a third stage for receiving signal output from the second stage

and an oscillation indicator signal wherein adjustment to the output of the second stage is made based on the power level region and the oscillation indicator signal.

7. The digital TV receiver according to claim 1, wherein the AGC includes a traffic
5 controller for halting adjustments to both of IF gain and RF gain based on a predefined noise threshold condition.

8. The digital TV receiver according to claim 1, wherein the AGC includes a traffic
controller for halting adjustments to both of IF gain and RF gain based on a
10 predefined steady state threshold condition.

9. The digital TV receiver according to claim 1, wherein the AGC includes a traffic
controller for selectively halting adjustments to IF gain and RF gain based on a
predefined saturation threshold condition.

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10. The digital TV receiver according to claim 1, wherein the AGC includes a traffic
controller for resetting the AGC based on a predefined saturation threshold
condition.

11. The digital TV receiver according to claim 1, wherein the AGC includes a traffic controller for selectively halting adjustments to IF gain and RF gain based on a predefined deviation from a standard region.

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12. The digital TV receiver according to claim 1, wherein the AGC includes a hysteresis-curve-based switching circuit for alternatively halting adjustments to IF gain while adjusting RF gain and halting adjustments to RF gain while adjusting IF gain.

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13. The digital TV receiver according to claim 1, wherein the AGC includes a recursive switching circuit for controlling IF gain and RF gain when there is a deviation in power level region or when one of the IF gain and RF gain becomes saturated.

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14. An automatic gain controller (AGC) for use in a digital TV receiver having an IF amplifier, an RF amplifier, an analog to digital converter (ADC) connected to the IF amplifier, and a demodulator connected to the ADC, the AGC comprising:

a signal estimation unit for selecting as a feedback signal one of a digitized IF signal output of the ADC and a demodulated signal output of the demodulator;

a signal detection unit for detecting the conditions of the feedback signal and outputting status signals; and

5 a traffic controller for receiving the status signals and outputting control signals based on the status signals to an IF gain controller and an RF gain controller for independent gain control of the RF amplifier and the IF amplifier.

15. The AGC according to claim 14, wherein the status signals represent at least one of
10 saturation, noisy, or steady state characteristics of the feedback signal.

16. The AGC according to claim 14, wherein the signal estimation unit includes a coefficient updator for adaptively adjusting a coefficient update signal based on saturation characteristics of the demodulated signal.

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17. The AGC according to claim 16, wherein the IF gain controller obtains an error signal based on the difference between the coefficient update signal and one of the demodulated signal and the signal output from the ADC, and the IF gain controller

has piece-wise linearization stages for processing the error signal to control the IF gain.

18. The AGC according to claim 16, wherein the RF gain controller obtains an error signal based on the difference between the coefficient update signal and one of the demodulated signal and the signal output from the ADC, and the RF gain controller has piece-wise linearization stages for processing the error signal to control the RF gain.

19. The AGC according to claims 17 or 18, wherein the piece-wise linearization stages include: first stage for resetting the error signal to a predefined constant if a power of the feedback signal is within a high one of a high, middle and reference power level regions, and for passing-through the error signal if the power of the feedback signal is within one of the middle and reference power level regions; and a second stage for disproportionally scaling the output of the first stage based on the power level region.

20. The AGC according to claim 19, wherein the piece-wise linearization stages further include a third stage for receiving signal output from the second stage and an oscillation indicator signal wherein adjustment to the output of the second stage

is made based on the power level region and the oscillation indicator signal.

21. The AGC according to claim 14, wherein the traffic controller halts both of the IF gain controller and the RF gain controller based on a predefined noise threshold condition.

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22. The AGC according to claim 14, wherein the traffic controller halts both of the IF gain controller and the RF gain controller based on a predefined steady state threshold condition.

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23. The AGC according to claim 14 , wherein the traffic controller selectively halts the IF gain controller and the RF gain controller based on a predefined saturation threshold condition.

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24. The AGC according to claim 14, wherein the traffic controller resets the AGC based on a predefined saturation threshold condition.

25. The AGC according to claim 14, wherein the traffic controller selectively halts

the IF gain controller and the RF gain controller based on a predefined deviation from a standard region.

26. The AGC according to claim 14, wherein the traffic controller includes a
5 hysteresis-curve-based switching circuit for alternatively halting the IF gain controller while adjusting the RF gain controller or halting the RF gain controller while adjusting the IF gain controller.

27. The AGC according to claim 14, wherein the traffic controller includes a
10 recursive switching circuit for switching gain control between IF and RF amplifiers when there is a deviation in power level region or when one of the IF gain controller and the RF gain controller becomes saturated.

28. A method of automatic gain controlling IF and RF amplifiers in a digital TV
15 receiver having an analog to digital converter (ADC) connected to the IF amplifier, and a demodulator connected to the ADC, the method comprising:

selecting as a feedback signal one of a digitized IF signal output of the ADC and a demodulated signal output of the demodulator;

detecting the conditions of the feedback signal and outputting status signals; and

receiving the status signals and outputting control signals based on the status signals

to an IF gain controller and an RF gain controller for independent gain control of

the RF amplifier and the IF amplifier.

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29. The method according to claim 28, wherein the status signals represent at least one

of saturation, noisy, or steady state characteristics of the feedback signal.

30. The method according to claim 28, further including the steps of: receiving the

10 demodulated signal and outputting a coefficient update signal based on saturation

characteristics of the demodulated signal.

31. The method according to claim 30 , further including the steps of: obtaining an

error signal based on the difference between the coefficient update signal and one

15 of the demodulated signal and the signal output from the ADC, and processing the

error signal using piece-wise linearization stages to control the IF gain.

32. The method according to claim 30 , further including the steps of: obtaining an

error signal based on the difference between the coefficient update signal and one of the demodulated signal and the signal output from the ADC, and processing the error signal using piece-wise linearization stages to control the RF gain.

5 33. The method according to claims 31 or 32 , wherein the piece-wise linearization stages include: first stage for resetting the error signal to a predefined constant if a power of the feedback signal is within a high one of a high, middle and reference power level regions, and for passing-through the error signal if the power of the feedback signal is within one of the middle and reference power level regions; and
10 a second stage for disproportionally scaling the output of the first stage based on the power level region.

 34. The method according to claim 33, wherein the piece-wise linearization stages further include a third stage for receiving signal output from the second stage and
15 an oscillation indicator signal wherein adjustment to the output of the second stage is made based on the power level region and the oscillation indicator signal.

 35. The Method according to claim 28 , further including the step of halting both of the IF gain controller and the RF gain controller based on a predefined noise threshold

condition.

36. The method according to claim 28 , further including the step of halting both of the IF gain controller and the RF gain controller based on a predefined steady state threshold condition.

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37. The method according to claim 28 , further including the step of selectively halting the IF gain controller and the RF gain controller based on a predefined saturation threshold condition.

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38. The method according to claim 28 , further including the step of resetting the AGC based on a predefined saturation threshold condition.

39. The method according to claim 28 , further including the step of selectively halting the IF gain controller and the RF gain controller based on a predefined deviation from a standard region.

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40. The method according to claim 28, further including the step of

hysteresis-curve-based switching by alternatively halting the IF gain controller while adjusting the RF gain controller or halting the RF gain controller while adjusting the IF gain controller.

- 5 41. The method according to claim 28 , further including for recursively switching gain control between IF and RF amplifiers when there is a deviation in power level region or when one of the IF gain controller and the RF gain controller becomes saturated.